IFW 2826/18

Docket No.: TESSERA 3.0-159 DIV (PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
John W. Smith

Application No.: 09/942,363

Filed: August 29, 2001

For: MICROELECTRONIC ASSEMBLIES WITH COMPOSITE CONDUCTIVE ELEMENTS

Group Art Unit: 2826

Examiner: P. L. Greene

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

RESPONSE

Dear Sir/Madam:

The present communication is responsive to the Official Action mailed December 3, 2003. A petition for a three-month extension of the term for response to said Official Action, to and including June 3, 2004, is transmitted herewith.

The Examiner's indication that claims 4 and 14 were not rejected, but instead are merely objected to as dependent upon a rejected base claim, is noted with appreciation. However, these claims have not been amended to stand in independent form at this time, inasmuch as it is believed that the claims from which they depend will ultimately be held allowable.

Claims 1-3 and 5-10 were rejected under 35 U.S.C. § 103 as unpatentable over *Akram et al.*, U.S. Patent 6,528,894 in view of *Johnson et al.*, U.S. Patent 6,043,990.[1]

Reconsideration and withdrawal of the rejection are respectfully requested. Nothing in either reference has been pointed as meeting the recitation in claim 1 that the layer of conductive material surrounding the core has "a melting temperature less than about 150°C," or the narrower recitation of claim 2 that the melting temperature of this layer material is "less than about 85°C." Nor has anything in either reference been cited as meeting the recitation of claim 3 that the melting temperature of the conductive material is "within or below" the "normal operating temperature range" of the microelectronic elements in the assembly.

The function of these features in preferred embodiments of the invention is discussed at paragraphs 0010 and 0033 of the present specification. As explained therein, applicants have found that by using a very low melting conductive material, rather than a conventional solder, as the coating on a higher-melting core, the conductive material may be allowed to melt when the assembly is subjected to thermal stress in operation, thereby allowing relative movement of the two microelectronic elements. For example, in the finished assembly of Fig. 3, the conductive material 42 liquefies during normal operation of the microelectronic elements in the assembly, thereby allowing chip or first element 24 (shown in Fig. 2 at the top of the assembly) to move relative to the second element or dielectric film 38, and thereby relieve mechanical stresses on solder joints 52 which would otherwise be created by differential thermal expansion of circuit board 48 relative to

[1] The statement of rejection at page 2 of the Official Action refers to claims 1-3 and 5-9; however, claim 10 is clearly encompassed by this rejection as shown by page 3 of the Official Action.

the chip or first element 24. In the most preferred embodiments, such stress relief is provided within the normal operating temperature range of the assembly (claim 3), and most typically at less than about 85°C (claim 2). However, in the broader compass of the invention, the stress relief may be provided at a temperature which may not be within the normal operating temperature range of the assembly, but nonetheless is at or below 150°C (claim 1), as for example, during abnormally severe thermal cycling.

Nothing in either reference relied upon for rejection has been pointed out as suggesting the use of a conductive material having a melting point within the ranges recited in any of claims 1, 2 or 3. The references in *Johnson* to solder balls "having a high melting point core, typically made of copper, and a low melting point exterior made of solder" (col. 2, lns. 23-24) must be understood in the context of the teaching of the reference to use "solder balls with high melting point cores as known in the art" (col. 2, lns. 49-50), as for example, "solder balls 59 having a high melting point core 59A and a low melting point solder exterior 59B," which may be "solid coated copper balls manufactured by Brush Wellman of Pennsylvania," *i.e.*, the conventional solid-core solder balls of the art. The melting temperature of solder used on solid-core solder balls, like the melting temperature of solder conventionally used in making all aspects of the assembly, is selected so that the solder remains solid after the assembly has been fabricated, *i.e.*, so that the solder does not melt once the assembly has been fabricated. Conventional solders such as those used for attaching microelectronic devices to circuit boards have melting temperatures in excess of 179°C. *See*, for example, Solberg, Vern, "Design Guidelines For Surface Mount & Fine-Pitch Technology," 2nd ed., McGraw-Hill, copyright 1996 at pages 218-219 ("Solberg") (copy attached hereto as Appendix A).

Nothing in *Johnson* offers any reason to assume that its solder layers depart from this conventional practice in the art. The statement in *Johnson* that the solder on the solder balls may be "lower than the temperature of the solder used to connected the electrical devices" to the circuit boards bonded by the solder balls (col. 2, lns. 64-65) must be understood in context; it means that a relatively high temperature alloy (*e.g.*, one having a melting temperature above 218°C, as described in the Solberg text) is used for mounting the electronic devices, whereas a conventional alloy melting at above 179°C is used on the solder balls. In short, the only inference one can draw from *Johnson* is that it uses entirely conventional solders as the cover layers on the solder balls, which solders have melting temperatures in excess of 150°C and above 85°C. Such solders would have a melting temperature above the normal operating temperature range of the elements in the assembly.

Of course, it is not applicant's burden to prove what a reference does not teach. Rather, the burden of proof rests with the Patent and Trademark Office to adduce teachings in the prior art which, if combined, would meet all of the recitations in the claim. Nothing in *Johnson* has been cited which would meet this burden of proof. *Akram*, of course, is even more remote with respect to this point; the Official Action expressly concedes that *Akram* does not show a core with a layer of conductive material surrounding the core.

As the references, even if combined, would not meet the recitations of claim 1, and *a fortiori*, would not meet the narrower recitations of claims 2 and 3, the rejection under § 103 must be withdrawn as to these claims. The rejection, likewise, must be withdrawn with respect to claims 5-10 and 14.

As it is believed that the foregoing comments fully meet all of the rejections and objections set forth in the

Official Action, favorable reconsideration and allowance of all claims are earnestly solicited.

If, however, for any reason the Examiner does not believe that such action can be taken at this time, it is respectfully requested that he/she telephone applicant's attorney at (908) 654-5000 in order to overcome any additional objections which he/she might have.

If there are any additional charges in connection with this requested amendment, the Examiner is authorized to charge Deposit Account No. 12-1095 therefor.

Dated: June 3, 2004

Respectfully submitted,

By_____

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